

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

1. (Currently Amended) An isolated bacterium selected from the group consisting of *Salmonella*, *E. coli*, *Shigella*, ~~and~~ and *Campylobacter*, wherein the isolated bacterium does not express a functional NiFe hydrogenase protein that has a greater than 75% reduction in hydrogenase activity relative to a wild type strain of said bacterium.
2. Canceled
3. (Currently Amended) The isolated bacterium of claim [[2]] 1 wherein the strain isolated bacterium comprises a mutation to each of ~~the~~ three NiFe hydrogenase genes present in the genome of the strain isolated bacterium, wherein each ~~the~~ mutation[[s]] prevents the expression of a functional NiFe hydrogenase protein.
4. Canceled
5. (Currently Amended) The isolated bacterium of claim [[2]] 1 wherein the ~~bacterium is selected from the group consisting of~~ *Salmonella* is *Salmonella typhimurium*[[,]] or *Salmonella typhi*, the *E. coli* is *E. coli* 0157, the *Shigella* is *Shigella flexneri*[[,]] or ~~*Shingella*~~ *Shigella sonnei*, ~~and~~ and the *Campylobacter* is *Campylobacter jejuni*.
6. (Currently Amended) A composition comprising an isolated bacterium selected from the group consisting of *Helicobacter hepaticus*, *Salmonella typhimurium*, *Salmonella typhi*, *E. coli* 0157, *Shigella flexneri*, ~~*Shingella*~~ *Shigella sonnei*, ~~and~~ and *Campylobacter jejuni*, wherein the isolated bacterium does not express a functional NiFe hydrogenase protein wherein said bacterium has a greater than 75% reduction in hydrogenase activity relative to a wild type strain of said bacterium.

7. (Currently Amended) An antigenic composition comprising ~~an~~ the isolated bacterium of claim ~~[[3]]~~ 1 and a pharmaceutically acceptable carrier.
8. (Original) The antigenic composition of claim 7 further comprising an adjuvant.
9. Canceled
10. (Original) The antigenic composition of claim 7 in the form of a frozen or lyophilized powder.
11. (Withdrawn-Currently Amended) A method of inducing an immune response in a mammal against a pathogenic bacterium said method comprising the step of administering to said mammal a composition comprising ~~a live~~ the isolated bacterium of claim 6.
12. (Withdrawn-Currently Amended) The method of claim 11 wherein the bacterium is selected from the group consisting of *Salmonella typhimurium*, *Salmonella typhi*, *Helicobacter hepaticus*, *E. coli* 0157, *Shigella flexneri*, ~~*Shingella*~~ *Shigella sonnei*, ~~and~~ and *Campylobacter jejuni*.
13. (Withdrawn) The method of claim 12 wherein the modification comprises a mutation to each of the NiFe hydrogenase genes present in the genome of the bacterium.
14. (Withdrawn-Currently Amended) A method of protecting a mammalian species against an infection with pathogenic *Salmonella*, *E. coli*, *Shigella*, or *Campylobacter*, said method comprising the step of administering to the subject a live bacterium, selected from the group consisting of *Salmonella*, *E. coli*, *Shigella*, ~~and~~ and *Campylobacter*, wherein the bacterium has been modified to prevent expression of a functional NiFe hydrogenase protein.

15. (Withdrawn) The method of claim 14 wherein the live modified bacterium is administered orally at a dose of about 10^4 to about 10^8 cfu.
16. (Withdrawn) The method of claim 14 wherein the modification comprises a deletion mutation to each of the NiFe hydrogenase genes present in the genome of the bacterium.
17. (Withdrawn) The method of claim 16 wherein the mammalian species is protected from a *Salmonella* infection, said method comprising administering live *Salmonella* wherein each of the NiFe hydrogenase genes present in the genome of the bacterium has been mutated to prevent expression of a functional NiFe hydrogenase protein.
18. Canceled
19. (Currently Amended) The isolated bacterium of claim [[2]] 3 wherein said isolated bacterium is ~~a mutant *Salmonella typhimurium* or *Salmonella typhi*, and wherein the isolated bacterium strain has~~ comprises three deletion mutations, wherein the first deletion is flanked by nucleotides 1-136 and nucleotides 137-232 of SEQ ID NO:7, wherein the second deletion is flanked by nucleotides 1-289 and nucleotides 290-518 of SEQ ID NO:8, and wherein the third deletion is flanked by nucleotides 1-200 and nucleotides 201-333 of SEQ ID NO:9 ~~made at STM 3147, STM 1538, and STM 1786 that prevent expression of the corresponding gene products.~~
20. (Currently Amended) The composition of claim 6 wherein the isolated bacterium comprises a mutation to each of three NiFe hydrogenase genes present in the genome of the isolated bacterium, wherein each mutation ~~one or more NiFe hydrogenase genes of said bacterium have been mutated to prevent~~ expression of the a functional NiFe hydrogenase gene product.

21. (Currently Amended) The composition of claim 20 wherein ~~said composition comprises~~ the isolated bacterium is *S. ~~Typhimurium~~ typhimurium* strain ~~[(~~()~~]JSG 321[~~()~~]~~, deposited with the American Type Cell Culture Collection depository (~~10801 University Blvd, Manassas, Virginia, 20108, USA~~), on February 4, 2005 and assigned deposit under Accession No: PTA-6556.

22. (New) The isolated bacterium of claim 1 wherein NiFe hydrogenase activity expressed by the cell is undetectable.

23. (New) An isolated bacterium selected from the group consisting of *Salmonella*, *E. coli*, *Shigella*, and *Campylobacter* that has decreased O₂-dependent H₂ oxidation activity relative to a wild type strain of said bacterium, and wherein the isolated bacterium has decreased virulence relative to a wild type strain of said bacterium when orally administered to mice.

24. (New) *S. typhimurium* strain JSG 321 deposited with the American Type Culture Collection depository under Accession No: PTA-6556.